Synopsis of Nuclear Disasters

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The impact of nuclear accidents on human health has been a subject matter of debate ever since the construction of nuclear power reactors for the first time in 1954. Since the first inception, a total of 29 notable nuclear power plant accidents around the globe involving either multiple fatalities or property damage of more than 100 million US dollars have been reported by the International Atomic Energy Agency, Vienna. Austria. Among them the most notable one is the nuclear accident that occurred in Chernobyl, Russia on April 26, 1986 owing primarily to overheating and meltdown of the reactors. According to UNSCEAR report in 2008, the Chernobyl accident resulted in the evacuation of more than 300,000 people with as many as 30 fatalities directly related to radiation and 19 unrelated. Additionally, 15 children were reported to die of thyroid cancer. According to the International Nuclear Event Scale (INES) which is based on the significance of impact on people and the environment, Chernobyl accident received the highest level of 7. Other most significant 9 accidents based on INES levels include Fukushima Daiichi, Japan in 2011 (level 7), Kyshtym, Russia in 1957 (level 6), Windscale Fire, UK in 1957 (level 5), Three Mile Island Accident, Pennsylvania, USA in 1979 (level 5), Goiania, Brazil in 1987 (level 5), Idaho, USA in 1961 (level 4), Saint Laurent, France in 1969 (level 4), Buenos Aires, Argentina in 1983 (level 4) and Tokaimura, Japan in 1999 (level 4). Among these, Goiania is an exception that involved radioactive contamination when an old radiotherapy unit was stolen and the radioactive content (Caesium-137) was distributed as a gift to many people because of its luminous nature. This event led to the screening of more than 100,000 people of which radioactive contamination was found in a few hundreds of people.

In the case of Chernobyl accident, some senior officials allowed the disabling of key circuits and ignoring of warning signs that otherwise would have led to the normal shutdown of the reactor. On the other hand, nuclear accident in Fukushima Daiichi, which was also ranked as level 7 like Chernobyl, occurred as a result of a 15 meter tsunami that followed a major earthquake disabling the power supply and cooling of the three major reactors. All the core reactors largely melted within a span of 3 days releasing the radioactivity into the environment. The disaster at Kyshtym in 1957, ranked at level 6, was due to a radioactive contamination that occurred in plutonium production site in Russia for nuclear weapons and nuclear fuel processing plant of the Soviet Union. The incident was mainly due to the failure of a cooling system in one of the tanks that contained 70-80 tons of radioactive liquid waste. The chemical explosion resulted in a release of 20 MCi of radioactivity and most of it settled on nearby sites and polluted the Techa River. It was estimated that at least 10,000 residents of 22 villages were evacuated. From the foregoing account, it is obvious that most of the above mentioned accidents occurred due to either a series of equipment failures or human failures. Additionally, intentional nuclear terrorism will also result in mass casualty incidents affecting several tens of hundreds of humans. One of the major issues of any nuclear disaster is the release of massive amounts of radioactive material into the environment as it would take several tens of years for decay before a “safe level” is reached.

Currently, a total of 437 nuclear power plants are in operation throughout the world to meet the ever increasing demands of energy. As nuclear power is something that we cannot live without, it becomes pertinent to identify the potential causative factors for nuclear disasters and how to prevent them in the future to achieve the safe use of nuclear power.